



1065555

**RECEIVED**

MAR 22 2007

Office of Enforcement  
Compliance & Environmental  
Justice

Linda Jacobson  
RCRA Project Manager  
US EPA Region VIII  
8ENF-T  
1595 Wynkoop Street  
Denver, Colorado 80202-1129

March 19, 2007

SENT BY CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

Re: Post RI/FS Long-Term Monitoring Program, Updated Monitoring Program (March 2007) -  
Asarco East Helena Plant

Dear Ms. Jacobson:

Asarco has been conducting Post Remedial Investigation (RI)/Feasibility Study (FS) monitoring prescribed in the CERCLA program since 1991. On March 7, 2007, Asarco met with EPA and Montana Department of Environmental Quality representatives to review the preliminary groundwater quality data obtained from the January 2007 sampling effort. Based on this discussion, Asarco now proposes enhancing the RI/FS monitoring program by 1) providing more frequent sample collection on sensitive groundwater monitoring and residential wells, and 2) expanding the parameter list to include trace metal, metal speciation, and organic constituent analyses. A copy of the Updated Monitoring Program (March 2007) and the certification signed by an officer of ASARCO, LLC, under the East Helena Consent Decree are attached to this letter.

In the Updated Monitoring Program, Asarco is proposing abandonment of nine (9) groundwater monitoring wells at the Asarco East Helena smelter site and construction of two (2) additional groundwater monitoring wells in the former acid plant sediment drying area. The construction of the two additional monitoring wells will occur at the same time MW-11 is to be constructed.

We request EPA's prompt review of the enclosed Updated Monitoring Plan. Asarco intends to initiate the Updated Monitoring Plan in March 2007. Recognizing that this is a short time frame, Asarco anticipates that EPA's comments to the Updated Monitoring Plan may be incorporated into future sampling events, particularly the May 2007 event. In addition, we do not intend to collect laboratory split samples in during the March 2007 sampling event. Instead, we will evaluate the March data and consider a split sampling program pending its review. If you have any questions relating to this matter, please do not hesitate to notify me. Otherwise, we look forward to EPA's comments.

Sincerely,


  
Jon Nickel

Enclosure

cc: Denise Kirkpatrick

CERTIFICATION  
PURSUANT TO U.S. v ASARCO INCORPORATED  
(CV-98-3-H-CCL, USDC, D. Montana)

I certify under penalty of law that this document, Updated Monitoring Program (March 2007) and all attachments, were prepared under my direct supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

Signature   
Name: Thomas L. Aldrich  
Title: Vice President Environmental Affairs  
Date: March 19, 2007

## Updated Monitoring Program – March 2007

### **Interim Measures**

- Residential Well Sampling

Four residential wells in the northwest corner of East Helena on Gail Street have been monitored bimonthly through September 2006. The four residential wells are those that would have the highest potential to show future impacts (if they were to occur) from arsenic in groundwater in the City of East Helena. As of October 2006, the frequency of the program for these four wells was increased to monthly. This decision was made as a result of low-level detectable arsenic concentrations (0.003 mg/l to 0.006 mg/l) measured in September 2006. Previous monitoring results of these wells showed arsenic concentrations below laboratory detection limits (<0.002 mg/l). Although the arsenic concentrations are below Federal MCLs (0.01 mg/l) for drinking water and below State of Montana Human Health Standard (0.01 mg/l), the monitoring frequency of these four wells was increased to monthly and the parameter list was expanded to provide additional information on groundwater conditions associated with these wells. The residential well monitoring program is shown on Table 2. The 2007 residential well analytical program is summarized on Table B.

- Selenium Investigation Monitoring Well Sampling

Sixteen wells (EH-100 through EH-117) (EH-105 and EH-108 were not constructed) will continue to be sampled on a bimonthly frequency in 2007. The first of the bimonthly sample events were conducted July and September 2006. The 2007 EH-series bi-monthly monitoring program is shown on Table 1 and on Table B. Beginning in March 2007, twenty-five additional wells were added to the bimonthly program to provide groundwater information both up-gradient and down-gradient of the arsenic plume and to evaluate the presence of selenium in these wells. These wells include several shallow aquifer wells up-gradient, and in the shallow aquifer in City of East Helena. The listing of bi-monthly wells is highlighted in yellow on Table 1. This list may be amended pending written comment from EPA and the State of Montana Department of Environmental Quality.

- Supplemental Trace Metal Groundwater Sampling Event

Nine (9) monitoring wells, four (4) residential wells and eleven CAMU monitoring wells (MW-1 through MW-10, and new well MW-11, which is to be completed) will be sampled and analyzed for a supplemental suite of trace metals. The listing of these wells is highlighted in green on Table 1. Excluding the CAMU wells (MW-1 through MW-11), this is a one-time analytical event to be conducted concurrently with the semi-annual May 2007 sample event (see Post-RI/FS Long-Term Monitoring, below). The nine monitoring wells were selected to provide a range of groundwater types, including up-gradient groundwater, groundwater with elevated arsenic concentrations, and groundwater that is down-gradient of source areas but with relatively low arsenic concentrations. The four residential wells selected are the same ones as use for monthly monitoring. Table 1 and Table C presents the supplemental trace metal groundwater sampling and analytical program. The rationale for the selection of monitoring wells and residential wells used for the program is in Table 3.

- Supplemental Organic Parameter Groundwater Sampling Event

At EPA's request, a one time sampling event for organic parameters will be conducted in May 2007 concurrent with the supplemental trace metal sampling event. Two wells (DH-27 and DH-64) will be sampled and analyzed for volatile and semi-volatile metals using EPA methods 8260 and 8270. The listing of these wells is highlighted in blue on Table 1. The supplemental organic analytical program is listed in Table D.

- **Well Abandonment Program**

A total of 9 monitoring wells will be abandoned to accommodate the cleaning and demolition activities scheduled for calendar year 2007. Wells to be abandoned are listed in Table 1 and are shown on Figures 1 and 2. As Figure 1 shows, the wells proposed for abandonment make up a small portion of the existing 130 well monitoring network. Figure 2 illustrates that the wells proposed for abandonment are in close proximity to structures scheduled for cleaning and demolition, and would likely be damaged or destroyed if they weren't properly abandoned. The wells will be abandoned in accordance with Administrative Rules of Montana (ARM), Title 36, Chapter 21. The wells will be properly filled with bentonite with a minimum of the top 3 feet of casing removed. A well abandonment completion form will be submitted in accordance with ARM 36.21 requirements.

- **Well Replacement Program**

Two monitoring wells (DH-45 and DH-46) that are proposed for abandonment will be replaced by new monitoring wells (ASPD-15 and ASPD-16). The purpose of the well replacement is to provide nearby monitoring locations for the slurry wall completed in 2006 in the former acid plant sediment drying area. DH-45 and DH-46 presently provide down-gradient water levels and water quality sampling points for the slurry wall. However these wells would likely be damaged or destroyed during the cleaning and demolition of the blast furnace flue (see Figure 2). As a result they will be abandoned prior to demolition activities and replaced with APSD-15 and APSD-16. The replacement wells will be constructed closure to the slurry wall and away from the blast furnace flue area.

### **Post-RI/FS Long-Term Monitoring**

Post-RI/FS Long-Term Monitoring has been conducted bi-annually as part of the East Helena CERCLA program from 1991 through 2006. The long-term monitoring program for 2007 is similar to the 2006 program and includes water level measurement in 122 monitoring wells (all monitoring wells in the area) and sampling of 105 monitoring wells. Long-term monitoring will again be conducted semi-annually in May and November and includes the following tasks:

- **Groundwater Monitoring Well Network Sampling.** A total of 105 monitoring wells will be sampled for key indicator parameters including: Arsenic and 6 metal parameters (As, Cu, Cd, Fe, Mn, Pb, Zn), arsenic speciation, and common ions. Water levels will be measured in all (122) existing monitoring wells. The monitoring well sample and analytical program is summarized in Table 1 and Table A.
- **Residential Well Sampling.** The long-term residential well sampling program for 2007 consists of annual sample collection from 20 residential wells in the East Helena area. Long-term monitoring sampling for residential wells will be conducted in May. The long-term sampling program is summarized in Table 2 and Table B and includes the same key diagnostic parameters as the monitoring well network program.
- **Surface Water Sampling.** The 2007 surface water sampling program includes six sites that have been monitored semiannually since 1991. The monitoring program is summarized on Tables 4 and Table E and includes essential diagnostic parameters arsenic and 6 metal parameters (As, Cu, Cd, Fe, Mn, Pb, Zn) and common ions. The surface water sites will also be analyzed for the supplemental trace metals list in May. (See Table 4 and Table C).

- CAMU Well Sampling. A summary of the CAMU monitoring well sampling program is contained in Table 1. A Design Analysis Report, Corrective Management Unit (CAMU), Sampling and Monitoring Plan (Hydrometrics, February, 2007) directly addresses monitoring requirements associated with CAMU wells MW-1 through MW-11. The 2007 CAMU monitoring program consists of water level measurement of 11 monitoring wells and quarterly sampling of 11 monitoring wells in the area surrounding the CAMU Phase 1 and Phase 2 cells. The analytical program for the CAMU wells is summarized in Table B and C.



**TABLE 1. LONG-TERM SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM  
FOR EAST HELENA - 2007**

	Site Code	Table Analyses <sup>1</sup>		Site Code	Table Analyses <sup>1</sup>		Site Code	Table Analyses <sup>1</sup>
1	APSD-1	A	47	DH-41	TBA	94	EH-101	AB
2	APSD-10	A	48	DH-42	A	95	EH-102	AB
3	APSD-11	SWL	49	DH-43	TBA	96	EH-103	AB
4	APSD-12	SWL	50	DH-44	TBA	97	EH-104	AB
5	APSD-13	TBA	51	DH-45	TBA	98	EH-106	ABC
6	APSD-15**	A	52	DH-46	TBA	99	EH-107	ABC
7	APSD-16**	A	53	DH-47	A	100	EH-109	AB
8	APSD-2	ABC	54	DH-48	A	101	EH-110	AB
9	APSD-3	A	55	DH-49	A	102	EH-111	AB
10	APSD-4	SWL	56	DH-5	A	103	EH-112	AB
11	APSD-7	A	57	DH-50	A	104	EH-113	AB
12	APSD-8	SWL	58	DH-51	A	105	EH-114	AB
13	APSD-9	SWL	59	DH-52	A	106	EH-115	AB
14	DH-1	A	60	DH-53	A	107	EH-116	AB
15	DH-10A	A	61	DH-54	A	108	EH-117	ABC
16	DH-11	AB	62	DH-55	SWL	109	MW-1	C*
17	DH-12	A	63	DH-56	SWL	110	MW-2	C*
18	DH-13	A	64	DH-57	A	111	MW-3	ABC
19	DH-14	SWL	65	DH-58	AB	112	MW-4	C*
20	DH-15	A	66	DH-59	AB	113	MW-5	C*
21	DH-16	A	67	DH-60	TBA	114	MW-6	C*
22	DH-17	A	68	DH-61	SWL	115	MW-7	ABC
23	DH-18	A	69	DH-62	A	116	MW-8	C*
24	DH-19R	A	70	DH-63	A	117	MW-9	C*
25	DH-2	AB	71	DH-64	ABC	118	MW-10	C*
26	DH-20	A	72	DH-65	SWL	119	MW-11***	C*
27	DH-21	ABC	73	DH-66	A	120	Sparge 1	SWL
28	DH-22	A	74	DH-67	A	121	Sparge 2	SWL
29	DH-23	A	75	DH-6	A	122	Sparge 3	A
30	DH-24	A	76	DH-7	AB	123	STW-1	A
31	DH-27	AD	77	DH-8	A	124	STW-2	SWL
32	DH-28	SWL	78	DH-9	A	125	STW-3	SWL
33	DH-29	A	79	EH-50	AB	126	STW-4	A
34	DH-3	ABC	80	EH-51	AB	127	STW-5	SWL
35	DH-30	A	81	EH-52	AB	128	STW-6	SWL
36	DH-31	A	82	EH-53	AB	129	STW-7	A
37	DH-32	A	83	EH-54	AB	130	STW-8	A
38	DH-33	A	85	EH-57A	AB	131	STW-9	A
39	DH-34	A	86	EH-58	AB			
40	DH-35	A	87	EH-60	ABC			
41	DH-36	A	88	EH-61	AB			
42	DH-37	A	89	EH-62	AB			
43	DH-38	A	90	EH-63	AB			
44	DH-39	TBA	91	EH-64	AB			
45	DH-4	A	92	EH-65	ABC			
46	DH-40	TBA	93	EH-100	AB			

**TABLE 1. LONG-TERM SEMI-ANNUAL GROUNDWATER MONITORING PROGRAM FOR EAST HELENA - 2007 (CONTINUED)**

<sup>1</sup> Samples will be analyzed for dissolved constituents field-filtered through a 0.45 µm filter. Wells listed as TBA are "To Be Abandoned" to accommodate the 2007 cleaning and demolition work. Wells listed as SWL are measured for static water levels only.

Table A.	2007 Standard Analytical Suite For Groundwater Samples
Table B.	2007 Residential Well and EH-100 Series Well Sampling Analytical Parameters (Yellow highlighted wells are sampled bi-monthly)
Table C.	2007 Well Sampling Supplemental Metal Parameter List (Green highlighted wells sampled in May 2007, only)
Table D.	Organic Sample Parameters (Blue highlighted wells sampled in May 2007, only)

\* See Design Analysis Report, CAMU Sampling and Monitoring Plan, Hydrometrics, February 2007 for sampling of wells MW-1 through MW-10).

\*\* Replacement wells for DH-45 and DH-46 to be abandoned to accommodate 2007 cleaning and demolition work.

\*\*\* Additional Monitoring Well To-Be-Constructed (Request of EPA).



**TABLE 2. RESIDENTIAL GROUNDWATER ANALYSES FOR  
EAST HELENA - 2007**

	Site Code	Address/P.O Box	Frequency	Analyses Tables <sup>1</sup>
1	Cacey Tamol (formerly Flage)	9 Gail / 273	Annual	A
2	Louise Nordstrom (irrigation well)	109 Gail / 601	Monthly	B,C**
3	Shane Mosier (formally Wojcik)	105 Gail / 168	Annual	A
4	Pat Foley (formerly Marcum) (drinking water)	203 Gail / 1551	Monthly	B,C
5	Tina and Jamie Marcum (formerly Cox)	303 Thuman / 1217	Annual	A
6	Bob Adkins (formerly Fred Lamping)	316 Montana / 194	Annual	A
7	Ed and Sally Lewing	607 Lewis / 354	Annual	A
8	Eli A St. Germaine (irrigation well)	126 East Clinton / 896	Annual	A
9	Eli A St. Germaine (drinking well)		Annual	A
10	Wayne Helfert	407 Porter / 858	Annual	A
11	John Jones (formerly Yuricic) (irrigation well)	301 Gail / 1690	Monthly	B,C**
12	Richard Morrow – REFUSES ACCESS	606 E. Groschell /	--	A
13	Robert Carlson	1 Gail / 994	Annual	A
14	Dave Duel (formerly Wiebeck)	3 Gail / 968	Annual	A
15	David Jensen (drinking and irrigation)	401 Gail / 1021	Monthly	B,C
16	Ken St. Clair	107 E. Groschell / 696	Annual	A
17	Gene Gage	210 E. Groschell / 731	Annual	A
18	American Chemet #4 (Neal Blossom)	1 Smelter Rd. / 1160	Annual	A
19	Mat Balcerzak (formerly Darlene Hulst Wiseman)	701 Manlove/1000	Annual	A-Rotate *
20	Leonard and Muriel (Mo) Hulst – 1 well	802 Manlove / 242	Annual	A-Rotate *
21	Leonard and Muriel (Mo) Hulst – 1 well		Annual	A-Rotate *
22	Kevin Hulst	800 Manlove/ 611	Annual	A-Rotate *
23	Twilight Trailer Park Well-1		Annual	A
24	Twilight Trailer Park Well-2		Annual	A
25	East Helena Municipal Well - 1		Annual	A
26	East Helena Municipal Well - 3		Annual	A

<sup>1</sup> Samples will be analyzed for dissolved constituents field-filtered through a 0.45 µm filter.

Table A. 2007 Standard Analytical Suite For Groundwater Samples  
Table B. 2007 Residential Well and EH-100 Series Well Sampling Analytical Parameters  
Table C. 2007 Well Sampling Supplemental Trace Metal Parameter List  
(One-time conducted in May 2007)

\* One Hulst well will be sampled annually. Sampled wells may be rotated from year to year.  
\*\* Sampling schedule pending well operational status. Irrigation wells may be “winterized” during some portions of the year and samples may not be available during those times.



**TABLE 3. WELL SELECTION RATIONALE FOR THE SUPPLEMENTAL TRACE METAL SAMPLE AND ANALYSIS PROGRAM**

Well	Location	Comments
DH-3	Up-gradient Well South of Plant	Provide trace metal concentrations typical of up-gradient groundwater.
APSD-2	Former Acid Plant Sediment Drying Area.	Provide trace metal concentrations for groundwater that has elevated arsenic concentrations that are typical of the former acid plant sediment drying area source area.
DH-21	Speiss/Dross Area	Provide trace metal concentrations for groundwater that has elevated arsenic concentrations that are typical of the former speiss/dross source area.
DH-64	North Plant Boundary Area	Provide trace metal concentrations for groundwater that has elevated arsenic concentrations that are typical of the shallow and intermediate arsenic plume at the north plant boundary area.
EH-60	East Helena on Pacific Street	Provide trace metal concentrations for groundwater that has elevated arsenic concentrations that are typical of the north edge of the shallow arsenic plume in the southern boundary of the City of East Helena.
EH-65	East Helena on Riggs Street	Provide trace metal concentrations for groundwater that has low arsenic concentrations that are typical of groundwater down-gradient of the shallow arsenic plume in the southern boundary of the City of East Helena.
EH-106	East Helena on Riggs Street	Provide trace metal concentrations for groundwater that has elevated arsenic concentrations that are typical of the intermediate aquifer arsenic plume in the eastern portion of the City of East Helena.
EH-107	East Helena on Riggs Street	Provide trace metal concentrations for groundwater that has low arsenic concentrations that are typical of the intermediate aquifer outside of the arsenic plume in the central portion of the City of East Helena.
EH-117	East Helena Area, Northwest of Gail Street and West of 4 <sup>th</sup> Street	Provide trace metal concentrations for groundwater that has low arsenic concentrations that are typical of the intermediate aquifer in the northwest edge of the City of East Helena.
Louise Nordstrom (Irrigation Well, only)	109 Gail Street	Provide trace metal concentrations for groundwater that has low arsenic concentrations that are typical of residential wells in the northwest corner of East Helena. This well is one of four that would most likely show impacts from source area groundwater if impacts were to occur.
Pat Foley (Drinking and Irrigation Water)	203 Gail Street	Provide trace metal concentrations for groundwater that has low arsenic concentrations that are typical of residential wells in the northwest corner of East Helena. This well is one of four that would most likely show impacts from source area groundwater if impacts were to occur.
Jones Well (Irrigation Well, only)	301 Gail Street	Provide trace metal concentrations for groundwater that has low arsenic concentrations that are typical of residential wells in the northwest corner of East Helena. This well is one of four that would most likely show impacts from source area groundwater if impacts were to occur.

<b>TABLE 3.</b>	<b>(continued)</b>	
<b>Well</b>	<b>Location</b>	<b>Comment</b>
David Jensen (Drinking and Irrigation Water)	401 Gail Street	Provide trace metal concentrations for groundwater that has low arsenic concentrations that are typical of residential wells in the northwest corner of East Helena. This well is one of four that would most likely show impacts from source area groundwater if impacts were to occur.
<b>CAMU Monitoring Wells</b>		
MW-1	CAMU Area Well	Provide operational monitoring for the Phase I CAMU Cell
MW-2	CAMU Area Well	Provide operational monitoring for the Phase I CAMU Cell
MW-3	CAMU Area Well	Provide operational monitoring for the Phase I CAMU Cell
MW-4	CAMU Area Well	Provide operational monitoring for the Phase I CAMU Cell
MW-5	CAMU Area Well	Provide baseline and operational monitoring for the Phase I and Phase II CAMU Cells.
MW-6	CAMU Area Well	Provide baseline and operational monitoring for the Phase I and Phase II CAMU Cells.
MW-7	CAMU Area Well	Provide baseline and operational monitoring for the Phase I and Phase II CAMU Cells.
MW-8	CAMU Area Well	Provide baseline and operational monitoring for the Phase I and Phase II CAMU Cells.
MW-9	CAMU Area Well	Provide baseline and operational monitoring for the Phase I and Phase II CAMU Cells.
MW-10	CAMU Area Well	Provide baseline and operational monitoring for the Phase I and Phase II CAMU Cells.
MW-11*	CAMU Area Well	Provide baseline and operational monitoring for the Phase I and Phase II CAMU Cells.

\* New CAMU area monitoring well to be constructed in 2007.

**TABLE-4. SURFACE WATER ANALYSES -2007**

	<b>Site Code</b>	<b>Analyses</b>
<b>1</b>	LOWER LAKE	CE (1)
<b>2</b>	PPC-3A	CE (1)
<b>3</b>	PPC-5	CE (1)
<b>4</b>	PPC-7	CE (1)
<b>5</b>	PPC-8	CE (1)
<b>6</b>	PPC-101	None
<b>7</b>	PPC-102	None
<b>8</b>	PPC-103	CE (1)
<b>9</b>	WD-1	None
<b>10</b>	WD-2	None

- (1) Arsenic and metals analyses will be for both dissolved (Dis) and total (TOT) metals. Surface water sites will also be sampled and analyzed for the supplemental trace metal parameter list during the May 2007 sampling event.

**TABLE A. 2007 STANDARD ANALYTICAL SUITE FOR GROUNDWATER SAMPLES**

Parameter	Analytical Technique	Analytical Method	Project Detection Limit (ppm) <sup>1</sup>
<b>Physical Parameters</b>			
PH	pH Meter	MCAWW 150.1	
Specific Conductivity	SC Meter	MCAWW 120.1	
TDS	Gravimetric	MCAWW 160.1	10
TSS	Gravimetric	MCAWW 160.2	10
<b>Common Ions</b>			
Alkalinity	Titrimetric	MCAWW 310.1	1 (5 for CAMU Wells)
Bicarbonate	Titrimetric	MCAWW 310.1	1
Sulfate	Colorimetric	SW-846 9036	1
Chloride	Colorimetric	MCAWW 325.2	1
Calcium	ICP	SW-846 6010A	5
Magnesium	ICP	SW-846 6010A	5
Sodium	ICP FAA	SW-846 6010A SW-846 7770	5
Potassium	ICP FAA	SW-846 6010A SW-846 7610	5
Total Organic Carbon	UV Promoted, Persulfate Oxidation	EPA 415.2	2
<b>Arsenic and Metals</b>			
Arsenic	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005 (0.002 for residential samples)
Arsenic III	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005
Arsenic V	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005
Cadmium	ICP	SW-846 6010A	0.001
Copper	ICP	SW-846 6010A	0.004 (0.001 for CAMU Wells)
Iron	ICP ICP-MS	SW-846 6010A SW-846 6020	0.020 (0.01 for CAMU Wells)
Manganese	ICP ICP-MS	SW-846 6010A SW-846 6020	0.015 (0.01 for CAMU Wells)
Lead	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005 (0.003 for CAMU Wells)
Zinc	ICP ICP-MS	SW-846 6010A SW-846 6020	0.020 (0.01 for CAMU Wells)
<b>Field Parameters</b>			
SWL	Electric Tape	HF-SOP-10	0.01 ft
Temperature	pH Meter	HF-SOP-20	NA
Dissolved Oxygen (DO)	DO Meter	HF-SOP-22	NA
PH	pH Meter	HF-SOP-20	NA
Specific Conductivity (SC)	SC Meter	HF-SOP-79	NA

1. CAMU wells will be sampled in accordance with the Design Analysis Report Corrective Action Management Unit (CAMU) Sampling and Monitoring Plan (Hydrometrics, February 2007).



**TABLE B. 2007 RESIDENTIAL WELL AND EH-100 SERIES WELL  
SAMPLING ANALYTICAL PARAMETERS**

Parameter	Analytical Technique	Analytical Method	Project Detection Limit (ppm)
<b>Physical Parameters</b>			
PH	PH Meter	MCAWW 150.1	
Specific Conductivity	SC Meter	MCAWW 120.1	
TDS	Gravimetric	MCAWW 160.1	10
TSS	Gravimetric	MCAWW 160.2	10
<b>Common Ions</b>			
Alkalinity	Titrimetric	MCAWW 310.1	1
Bicarbonate	Titrimetric	MCAWW 310.1	1
Sulfate	Colorimetric	SW-846 9036	1
Chloride	Colorimetric	MCAWW 325.2	1
Calcium	ICP	SW-846 6010A	5
Magnesium	ICP	SW-846 6010A	5
Sodium	ICP FAA	SW-846 6010A SW-846 7770	5
Potassium	ICP FAA	SW-846 6010A SW-846 7610	5
<b>Arsenic and Metals</b>			
Arsenic	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005 (0.002 for residential samples)
Cadmium	ICP ICP-MS	SW-846 6010A SW-846 6020	0.001
Copper	ICP ICP-MS	SW-846 6010A SW-846 6020	0.004
Iron	ICP	SW-846 6010A	0.020
Manganese	ICP	SW-846 6010A	0.015
Lead	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005
Selenium	ICP-MS	SW-846 6010.20	0.005
Zinc	ICP ICP-MS	SW-846 6010A SW-846 6020	0.020
<b>Field Parameters</b>			
SWL	Electric Tape	HF-SOP-10	0.01 ft
Temperature	PH Meter	HF-SOP-20	NA
Dissolved Oxygen (DO)	DO Meter	HF-SOP-22	NA
PH	pH Meter	HF-SOP-20	NA
Specific Conductivity (SC)	SC Meter	HF-SOP-79	NA

**TABLE C. 2007 WELL SAMPLING SUPPLEMENTAL TRACE  
METAL PARAMETER LIST**

Parameter	Analytical Technique	Analytical Method	Project Detection Limit (ppm)
Physical Parameters			
PH	PH Meter	MCAWW 150.1	
Specific Conductivity	SC Meter	MCAWW 120.1	
TDS	Gravimetric	MCAWW 160.1	10
TSS	Gravimetric	MCAWW 160.2	10
Common Ions			
Alkalinity	Titrimetric	MCAWW 310.1	1
Bicarbonate	Titrimetric	MCAWW 310.1	1
Sulfate	Colorimetric	SW-846 9036	1
Chloride	Colorimetric	MCAWW 325.2	1
Calcium	ICP	SW-846 6010A	5
Magnesium	ICP	SW-846 6010A	5
Sodium	ICP	SW-846 6010A	5
	FAA	SW-846 7770	
Potassium	ICP	SW-846 6010A	5
	FAA	SW-846 7610	
Total Organic Carbon	UV Promoted, Persulfate Oxidation	EPA 415.2	2
Arsenic and Metals			
Arsenic	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005 (0.002 for residential samples)
Arsenic III	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005
Arsenic V	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005
Cadmium	ICP ICP-MS	SW-846 6010A SW-846 6020	0.001
Copper	ICP ICP-MS	SW-846 6010A SW-846 6020	0.004
Iron	ICP	SW-846 6010A	0.020
Manganese	ICP	SW-846 6010A	0.015
Lead	ICP	SW-846 6010A	0.005
	ICP-MS	SW-846 6020	
Selenium	ICP-MS	SW-846 6010.20	0.005
Zinc	ICP	SW-846 6010A	0.020
	ICP-MS	SW-846 6020	
Field Parameters			
SWL	Electric Tape	HF-SOP-10	0.01 ft
Temperature	PH Meter	HF-SOP-20	NA
Dissolved Oxygen (DO)	DO Meter	HF-SOP-22	NA
PH	pH Meter	HF-SOP-20	NA
Specific Conductivity (SC)	SC Meter	HF-SOP-79	NA

**TABLE C. 2007 WELL SAMPLING SUPPLEMENTAL TRACE  
METAL PARAMETER LIST (CONTINUED)**

Parameter	Analytical Technique	Analytical Method	Project Detection Limit (ppm)
<b>Supplemental Trace Metals</b>			
Aluminum	ICP ICP-MS	SW-846 6010A SW-846 6020	0.1
Antimony	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005
Barium	ICP ICP-MS	SW-846 6010A SW-846 6020	0.1
Beryllium	ICP ICP-MS	SW-846 6010A SW-846 6020	0.001
Chromium	ICP ICP-MS	SW-846 6010A SW-846 6020	0.001
Cobalt	ICP ICP-MS	SW-846 6010A SW-846 6020	0.01
Mercury	ICP ICP-MS	SW-846 7040 SW-846 6020	0.006
Nickel	ICP ICP-MS	SW-846 6010A SW-846 6020	0.01
Selenium IV and VI Speciation		EPA 270.3	0.005
Silver	ICP ICP-MS	SW-846 6010A SW-846 6020	0.005
Thallium	ICP ICP-MS	SW-846 6010A SW-846 6020	0.002
Tin	ICP ICP-MS	SW-846 6010A SW-846 6020	0.1
Vanadium	ICP ICP-MS	SW-846 6010A SW-846 6020	0.01

**Table D. Organic Sample Parameters**

**Volatile Purgeable Organics By CG/MS 8260**

-----PQL*-----				-----PQL*-----			
	CAS NO.	$\mu\text{g/l}$	$\mu\text{g/g}$		CAS NO.	$\mu\text{g/l}$	$\mu\text{g/g}$
Acetone	67-64-1	50	10	2,2-Dichloropropane	594-20-7	1.0	0.20
Benzene	71-43-2	1.0	0.20	1,1-Dichloropropene	563-58-6	1.0	0.20
Bromobenzene	108-86-1	1.0	0.20	cis-1,3-Dichloropropene	10061-01-5	1.0	0.20
Bromochloromethane	74-97-5	1.0	0.20	trans-1,3-Dichloropropene	10061-02-6	1.0	0.20
Bromodichloromethane	75-27-4	1.0	0.20	Ethylbenzene	100-41-4	1.0	0.20
Bromoform	75-25-2	1.0	0.20	Hexachlorobutadiene	87-68-3	1.0	0.20
Bromomethane	74-83-9	1.0	0.20	2-Hexanone	591-78-6	20	4.0
n-Butylbenzene	104-51-8	1.0	0.20	Iodomethane	74-88-4	1.0	0.20
sec-Butylbenzene	135-98-8	1.0	0.20	Isopropylbenzene	98-82-8	1.0	0.20
tert-Butylbenzene	98-06-6	1.0	0.20	p-Isopropyltoluene	99-87-6	1.0	0.20
Carbon Disulfide	75-15-0	1.0	0.20	Methyl Ethyl Ketone			
Carbon Tetrachloride	66-23-5	1.0	0.20	(2-Butanone)	78-93-3	20	4.0
Chlorobenzene	108-90-7	1.0	0.20	Methyl Isobutyl Ketone			
Dibromochloromethane	124-48-1	1.0	0.20	(4-Methyl-2-pentanone)	108-10-1	20	4.0
Chloroethane	75-00-3	1.0	0.20	Methylene Chloride			
2-Chloroethyl Vinyl Ether	110-75-8	1.0	0.20	(Dichloromethane)	75-09-2	1.0	0.20
Chloroform	67-66-3	1.0	0.20	Naphthalene	91-20-3	1.0	0.20
Chloromethane	74-87-3	1.0	0.20	n-Propylbenzene	103-65-1	1.0	0.20
2-Chlorotoluene	95-49-8	1.0	0.20	Styrene	100-42-5	1.0	0.20
4-Chlorotoluene	106-43-4	1.0	0.20	Tetrachloroethene			
1,2-Dibromo-3-chloropropane				(Tetrachloroethylene)	127-18-4	1.0	0.20
(DBCP)	96-12-8	1.0	0.20	1,1,1,2-Tetrachloroethane	630-20-6	1.0	0.20
1,2-Dibromoethane (EDB)	106-93-4	1.0	0.20	1,1,2,2-Tetrachloroethane	79-34-5	1.0	0.20
Dibromomethane	74-95-3	1.0	0.20	1,2,3-Trichlorobenzene	87-61-6	1.0	0.20
1,2-Dichlorobenzene	95-50-1	1.0	0.20	1,2,4-Trichlorobenzene	120-82-1	1.0	0.20
1,3-Dichlorobenzene	541-73-1	1.0	0.20	1,1,1-Trichloroethane	71-55-6	1.0	0.20
1,4-Dichlorobenzene	106-46-7	1.0	0.20	1,1,2-Trichloroethane	79-00-5	1.0	0.20
Dichlorodifluoromethane	75-71-8	1.0	0.20	Trichloroethene			
1,1-Dichloroethane	75-34-3	1.0	0.20	(Trichloroethylene)	79-01-6	1.0	0.20
1,2-Dichloroethane	107-06-2	1.0	0.20	Trichlorofluoromethane	75-69-4	1.0	0.20
1,1-Dichloroethene	75-35-4	1.0	0.20	1,2,3-Trichloropropane	96-18-4	1.0	0.20
cis-1,2-Dichloroethene	156-59-2	1.0	0.20	1,2,4-Trimethylbenzene	95-63-6	1.0	0.20
trans-1,2-Dichloroethene	156-60-5	1.0	0.20	1,3,5-Trimethylbenzene	108-67-8	1.0	0.20
1,2-Dichloropropane	78-87-5	1.0	0.20	Toluene	108-88-3	1.0	0.20
1,3-Dichloropropane	142-28-9	1.0	0.20	Vinyl Acetate	108-05-4	1.0	0.20
				Vinyl Chloride			
				(Chloroethene)	75-01-4	1.0	0.20
				Xylenes:		1.0	0.20
				meta-	108-38-3		
				para-	106-42-3		
				ortho-	95-47-6		

\*Practical Quantitation Limit (PQL). If the sample is contaminated, it may require dilution prior to analysis. The PQL of diluted samples will be correspondingly higher.



**Table D. Organic Sample Parameters  
(continued)**

**Semi-Volatile Organics By CG/MS 8270**

		-----PQL*-----				-----PQL*-----	
	<u>CAS NO.</u>	<u>µg/l</u>	<u>µg/g</u>		<u>CAS NO.</u>	<u>µg/l</u>	<u>µg/g</u>
4-Chloro-3-methylphenol (p-Chloro-m-cresol)	59-50-7	10	0.33	4,6-Dinitro-2-methylphenol (4,6-Dinitro-o-cresol)	534-52-1	50	1.65
2-Chlorophenol	95-57-8	10	0.33	2,4-Dinitrophenol	51-28-5	50	1.65
4-Chlorophenol	106-48-9	10	0.33	2-Nitrophenol	88-75-5	10	0.33
Cresols:				4-Nitrophenol	100-02-7	50	1.65
2-Methylphenol	95-48-7	10	0.33	Pentachlorophenol	87-86-5	50	1.65
3-Methylphenol	108-39-4	10	0.33	Phenol	108-95-2	10	0.33
4-Methylphenol	106-44-5	10	0.33	2,4,5-Trichlorophenol	95-95-4	10	0.33
2,4-Dichlorophenol	120-83-2	10	0.33	2,4,6-Trichlorophenol	88-06-2	10	0.33
2,4-Dimethylphenol	105-67-9	10	0.33				

**BASE NEUTRAL EXTRACTABLES**

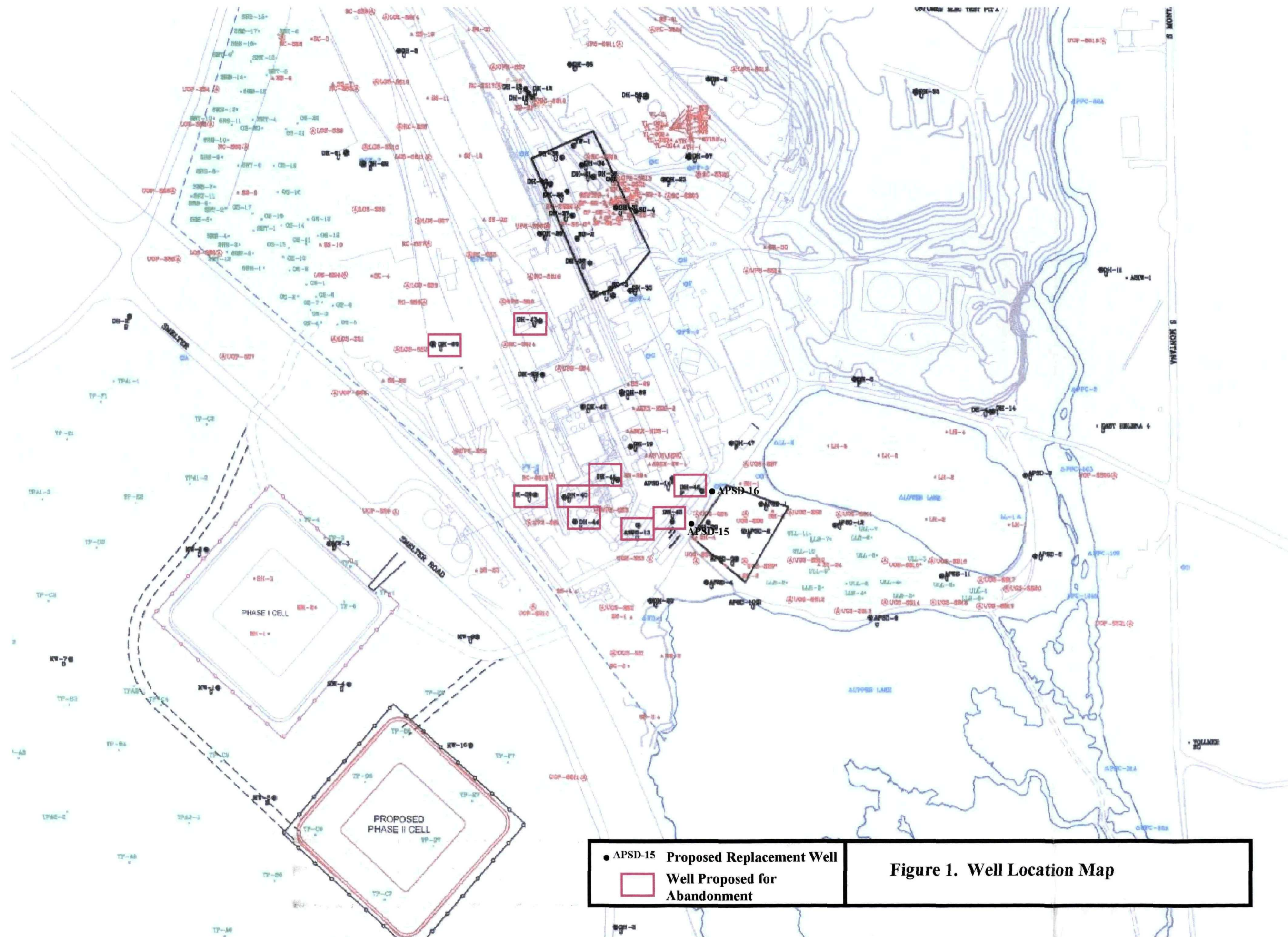
		-----PQL*-----				-----PQL*-----	
	<u>CAS NO.</u>	<u>µg/l</u>	<u>µg/g</u>		<u>CAS NO.</u>	<u>µg/l</u>	<u>µg/g</u>
Acenaphthene	83-32-9	10	0.33	Diethyl phthalate	84-66-2	10	0.33
Acenaphthylene	208-96-8	10	0.33	Dimethyl phthalate	131-11-3	10	0.33
Anthracene	120-12-7	10	0.33	2,4-Dinitrotoluene	121-14-2	10	0.33
Benz(a)anthracene	56-55-3	10	0.33	2,6-Dinitrotoluene	606-20-2	10	0.33
Benzidine	92-87-5	20	0.66	1,2-Diphenylhydrazine as Azobenzene	103-33-3	10	0.33
Benzo(b)fluoranthene	205-99-2	10	0.33	Fluorene	86-73-7	10	0.33
Benzo(k)fluoranthene	207-08-9	10	0.33	Fluoranthene	206-44-0	10	0.33
Benzo(g,h,i)perylene	191-24-2	10	0.33	Hexachlorobenzene	118-74-1	10	0.33
Benzo(a)pyrene	50-32-8	10	0.33	Hexachlorobutadiene	87-68-3	10	0.33
Bis(2-chloroethoxy)methane	111-91-1	10	0.33	Hexachlorocyclopentadiene	77-47-4	10	0.33
Bis(2-chloroethyl)ether	111-44-4	10	0.33	Hexachloroethane	67-72-1	10	0.33
Bis(2-chloroisopropyl)ether	108-60-1	10	0.33	Indeno(1,2,3-cd)pyrene	193-39-5	10	0.33
Bis(2-ethoxyhexyl)phthalate	117-81-7	10	0.33	Isophorone	78-59-1	10	0.33
4-Bromophenylphenylether	101-55-3	10	0.33	1-Methylnaphthalene	90-12-0	10	0.33
Butyl benzyl phthalate	85-68-7	10	0.33	2-Methylnaphthalene	91-57-6	10	0.33
2-Chloronaphthalene	91-58-7	10	0.33	Naphthalene	91-20-3	10	0.33
4-Chlorophenyl-phenylether	7005-72-3	10	0.33	Nitrobenzene	98-95-3	10	0.33
Chrysene	218-01-9	10	0.33	N-Nitrosodi-n-propylamine	621-64-7	10	0.33
Di-n-butyl phthalate	84-74-2	10	0.33	N-Nitrosodimethylamine	62-75-9	10	0.33
Di-n-octyl phthalate	117-84-0	10	0.33	N-Nitrosodiphenylamine	86-30-6	10	0.33
Dibenz(a,h)anthracene	53-70-3	10	0.33	Phenanthrene	85-01-8	10	0.33
1,2-Dichlorobenzene	95-50-1	10	0.33	Pyrene	129-00-0	10	0.33
1,3-Dichlorobenzene	541-73-1	10	0.33	Pyridine	110-86-1	20	0.66
1,4-Dichlorobenzene	106-46-7	10	0.33	1,2,4-Trichlorobenzene	120-82-1	10	0.33
3,3'-Dichlorobenzidine	91-94-1	20	0.66				

\*Practical Quantitation Limit (PQL). If the sample is contaminated, it may require dilution prior to analysis. The PQL of diluted samples will be correspondingly higher.

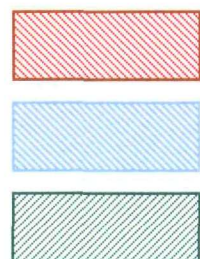
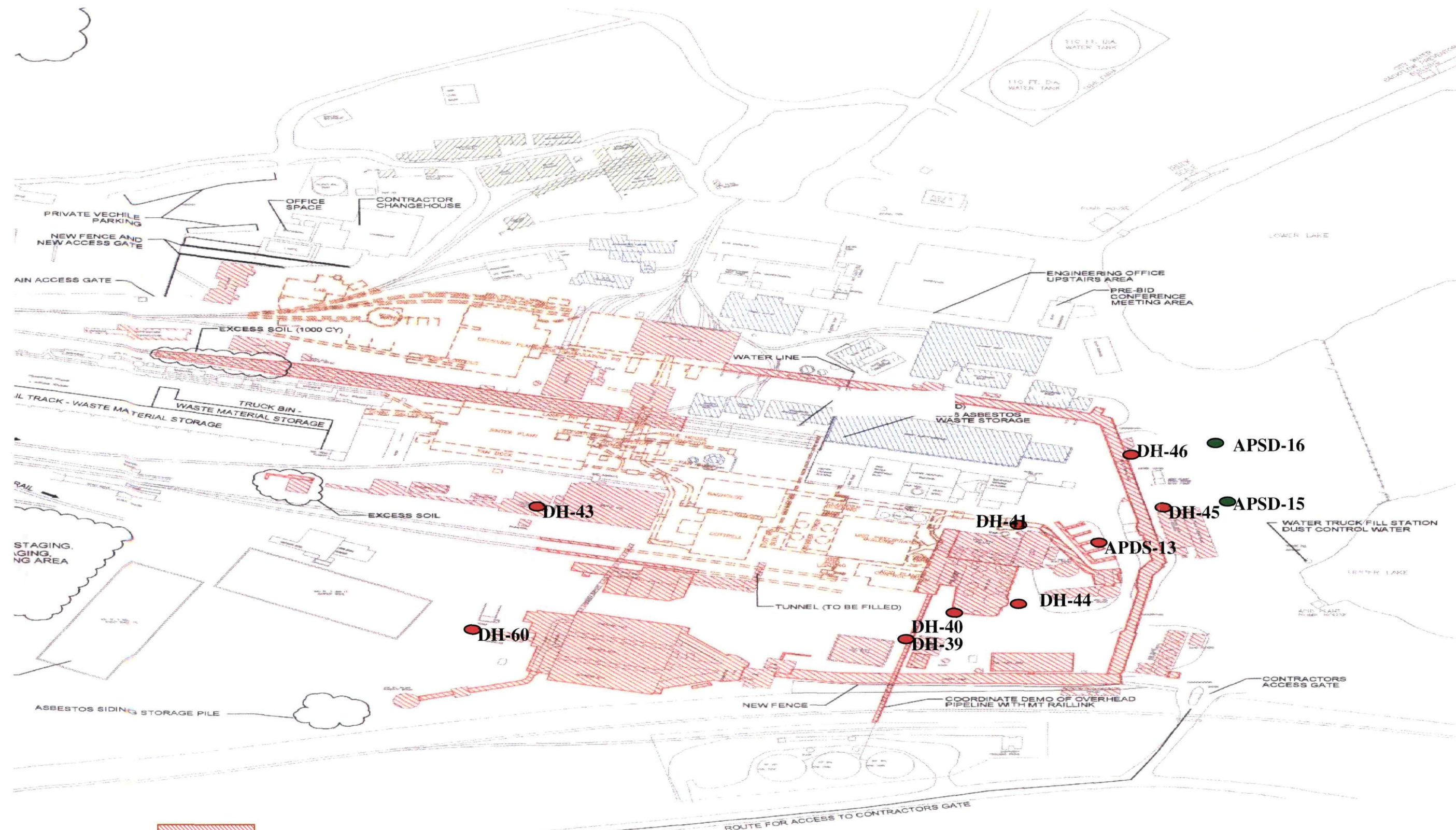
**TABLE E. 2007 ANALYTES AND STANDARD METHODS FOR SURFACE WATER SAMPLES**

Parameter	Analytical Technique	Analytical Method	Project Detection Limit (ppm)
<b>Physical Parameters</b>			
PH	pH Meter	MCAWW 150.1	
Specific Conductivity	SC Meter	MCAWW 120.1	
TDS	Gravimetric	MCAWW 160.1	10
TSS	Gravimetric	MCAWW 160.2	10
<b>Common Ions</b>			
Alkalinity	Titrimetric	MCAWW 310.1	1
Bicarbonate	Titrimetric	MCAWW 310.1	1
Sulfate	Colorimetric	SW-846 9036	1
Chloride	Colorimetric	MCAWW 325.2	1
Calcium	ICP	SW-846 6010A	5
Magnesium	ICP	SW-846 6010A	5
Sodium	ICP FAA	SW-846 6010A SW-846 7770	5
Potassium	ICP FAA	SW-846 6010A SW-846 7610	5
<b>Arsenic and Metals</b>			
Arsenic	GFAA HGAA ICP ICP-MS	SW-846 7060A SW-846 7061 SW-846 6010A SW-846 6020	0.005
Cadmium	GFAA FAA ICP ICP-MS	SW-846 7131A SW-846 7130 SW-846 6010A SW-846 6020	0.001
Copper	FAA ICP ICP-MS	SW-846 7210 SW-846 6010A SW-846 6020	0.004
Iron	ICP	SW-846 6010A	0.020
Manganese	ICP	SW-846 6010A	0.015
Lead	GFAA FAA ICP ICP-MS	SW-846 7121 SW-846 7420 SW-846 6010A SW-846 6020	0.005
Zinc	FAA ICP ICP-MS	SW-846 7950 SW-846 6010A SW-846 6020	0.020
<b>Field Parameters</b>			
Stream Flow	Flow Meter	HF-SOP-37 & HF-SOP-50	NA
Temperature	pH Meter	HF-SOP-20	NA
Dissolved Oxygen (DO)	DO Meter	HF-SOP-22	NA
PH	PH Meter	HF-SOP-20	NA
Specific Conductivity (SC)	SC Meter	HF-SOP-79	NA

Note: This table is the same as Table A for groundwater, with the exception that arsenic speciation is not measured







Structure Scheduled for Demolition in 2007

2007 Additive Alternate A Schedule for Demolition

2007 Additive Alternate B Schedule for Demolition

● DH-46 Well Proposed for Abandonment

● APSD-15 Proposed Replacement Well

Figure 2. Monitoring Wells To Be Abandoned